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September 28, 1995

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William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

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SEP 28 1995

Re: Ex Parte Presentation -- PR Docket No. 92-235

Dear Mr. Caton:

On Thursday, September 28, 1995, representatives of the Boeing Company made an ex parte presentation to Daniel B. Phythyon and Herbert W. Zeiler of the Wireless Telecommunications Bureau. Representing Boeing were Sheldon R. Bentley and John D. Warner of the Boeing Company and the undersigned of this Firm. The views expressed on behalf of Boeing are reflected in the enclosed materials, copies of which should also be placed in the record of CC Docket No. 92-297, GN Docket Nos. 90-357 and 93-252, and PR Docket Nos. 89-52, 93-144, and 93-253.

Please let us know if you have any questions.

Sincerely,

  
Joseph P. Markoski

/jef  
Enclosures

cc: Daniel B. Phythyon  
Herbert W. Zeiler

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# **Frequency Spectrum Issues**

**Ex Parte Presentation -- CC Docket No. 92-297;  
GN Docket Nos. 90-357 & 93-252; PR Docket Nos.  
89-52, 92-235, 93-144, & 93-253**

**The Boeing Company**

# **The Boeing Company**

(FY 1994)

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**Annual Revenues** \$21,924.M

**Foreign Sales** \$11,844.M

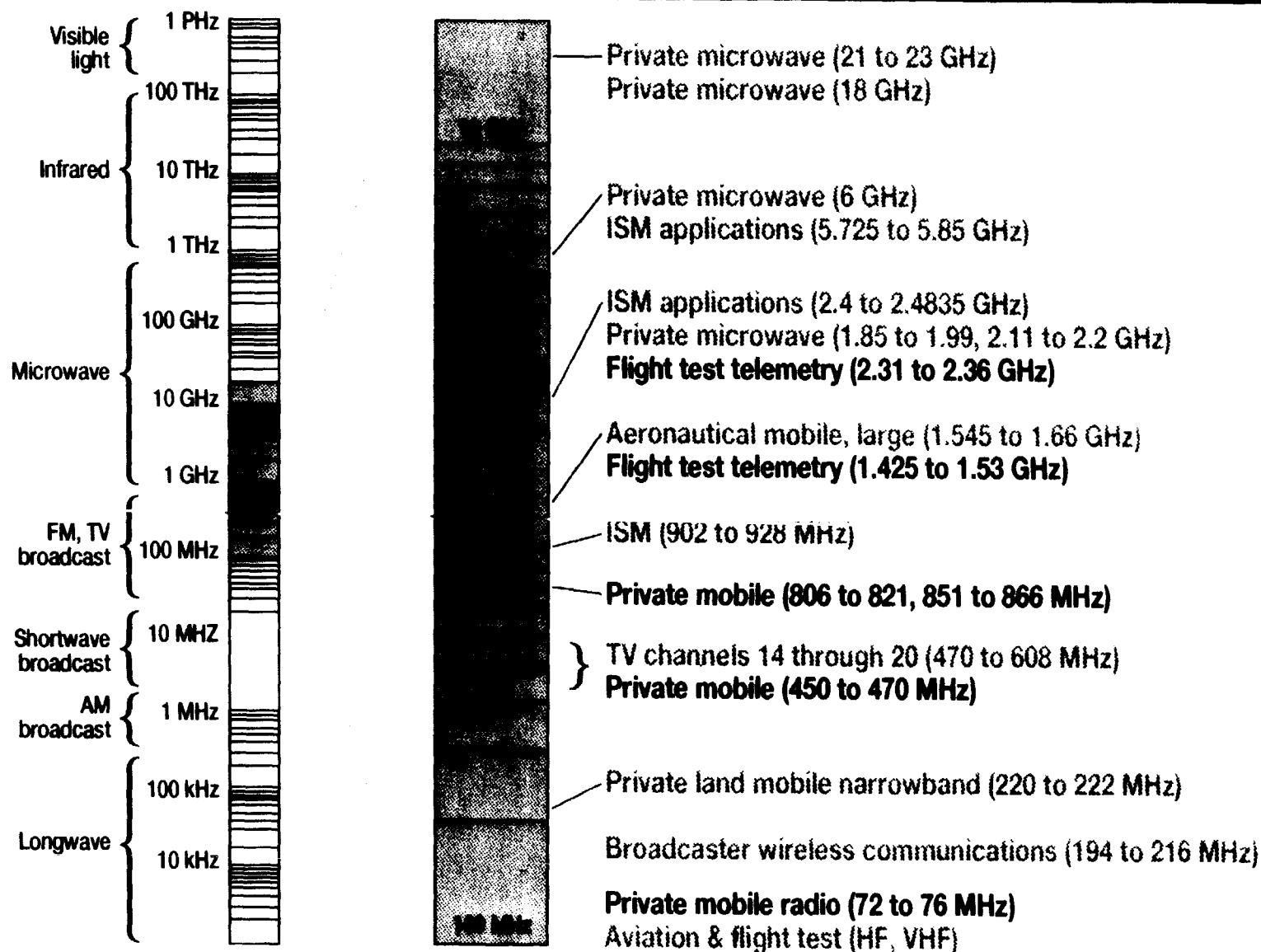
## **Employment**

- ◆ Employees (average) 119,400 individuals
- ◆ Subcontractors 10,666 companies

## **Facilities**

- ◆ Washington (Operations cover 1,300 Square Miles)
- ◆ Alabama
- ◆ California
- ◆ Kansas
- ◆ Montana
- ◆ Pennsylvania
- ◆ Texas
- ◆ Subcontractors - all 50 states

# Major Boeing Spectrum Uses



# **Boeing Spectrum Uses**

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## **Boeing Does Not Use Spectrum to Provide Services to Third Parties**

## **Boeing Uses Spectrum for Safety and Health Reasons:**

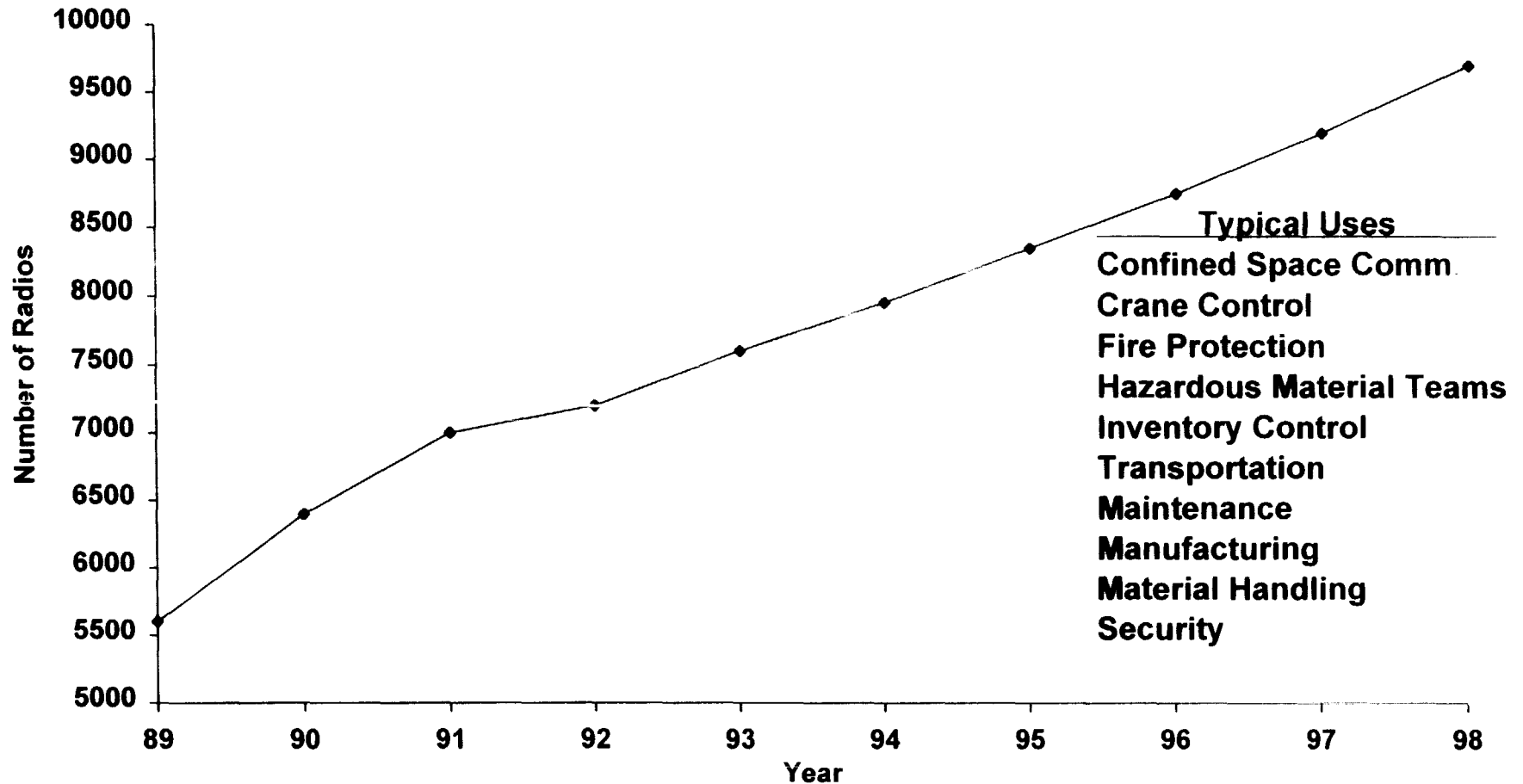
- ◆ Flight test telemetry
- ◆ Regulatory compliance -- Communication System for Confined Hazardous Areas (CSCHA), Hazardous Material (HazMat) response, "man-down" alarms
- ◆ Fire, security, alarms, emergency response, ties to municipalities for mutual aid

## **Boeing Uses Spectrum for Productivity Improvement:**

- ◆ Fabrication, machine programming, control and monitoring, cranes, material handling
- ◆ Data links, robotics, wireless local area networks (LANS), telecommunications backup, R & D
- ◆ Transportation

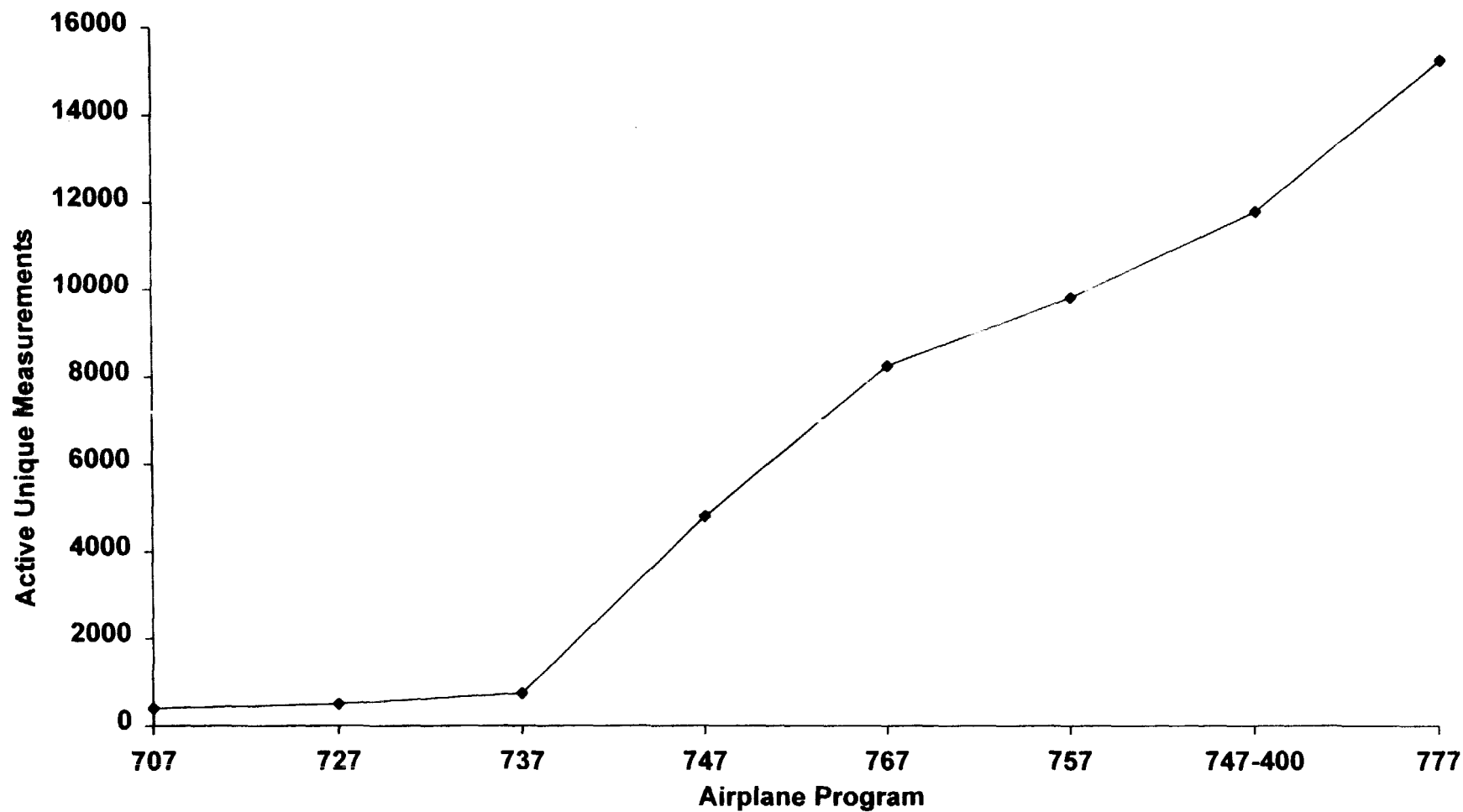
## **Boeing Foresees a Growing Demand for Spectrum Uses**

# Puget Sound Area Radio Growth



# Flight Test Measurement Growth 1954 - 1995

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# Future Telemetry Projections

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## Bandwidth and Capacity Requirements Are Being Driven by New Technologies:

- ◆ Faster data buses and flight safety validation requirements
- ◆ Airframe and digital flight controls designed as integrated systems
- ◆ Real-time video needs to evaluate new structural materials
- ◆ Correlation of visual data and test sensors

## Bandwidth Need Is Greater Than Linear With Time

<u>Year</u>	<u>Airframe</u>	<u>Data Points</u>	<u>Bandwidth</u>
1954	707	300 (approx.)	200 kHz
1995	777	40,000	20+ MHz



# Spectrum Use By Boeing Customers

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## Commercial Airplane Customers

- ◆ Communications Private Land Mobile, HF & VHF Air-Ground-Air and Air-Air Comm., ACARS, SATCOM
- ◆ Navigation GPS, Differential GPS, Radar, T/CAS, DME, Altimeters, Rescue Beacons, Transponders, Weather Radar, FANS
- ◆ Performance reporting HF/VHF Datalink
- ◆ Passenger services Cabin Service, In-Flight Telephones, Faxes, E-mail, Sky Radio, DBS-TV

## Defense Customers

- ◆ Military VLF, HF, VHF, & UHF Comm. Links, DGPS, DME, Telemetry, ILS, C-Band Remote Navigation System, Synthetic Aperture Radar, Microwave, Cross Band EMI testing
- ◆ NASA GLS, TT&C (TLM) Uplink, TDRS Downlink,

## Satellite Customers

- ◆ Direct Broadcast Satellite A/C Cabin Entertainment System
- ◆ Communications A/C Test Data, Sea Launch, Iridium
- ◆ Earth resource mapping
- ◆ Weather

# Spectrum Costs

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## Radio Spectrum Is Not "FREE"

### Boeing's Costs Include:

- ◆ Equipment investment (book value) \$108.M (1994 Dollars)
- ◆ Maintenance \$2.M per year (approx.)
- ◆ FCC license application fees, FCC regulatory fees, spectrum coordination fees, staff, coordinators and association/coalition memberships \$1M per year (approx.)

### These Costs Are Not Unique to Boeing

### Boeing and Its Customers Therefore Have Very Real Economic Incentives to Use Spectrum Efficiently:

- ◆ To reduce costs and remain competitive
- ◆ To use existing spectrum allocations for new applications

# **Spectrum Allocation and Licensing**

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## **Congress Has Directed the FCC in Allocating and Licensing Radio Spectrum to:**

- ◆ Promote the public convenience, interest, and necessity
- ◆ Promote the development and timely deployment of new and innovative radio services and technologies
- ◆ Promote the efficient and intensive use of radio spectrum
- ◆ Recover, where appropriate, "a portion of the value of the public spectrum resource made available for commercial use"

# **Spectrum Realities**

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**Industry Needs BOTH Private Radio and Commercial Radio Spectrum and Services to Satisfy Its Communications Needs**

**Commercial Mobile Radio Services Provide Effective and Efficient Solutions to Many of the Communications Needs of Industry**

- ◆ Cellular -- sales, some transportation
- ◆ Direct Broadcast Satellite (DBS) -- distribution of information
- ◆ In-flight phone -- business travelers

**Private Radio Often Provides the ONLY Solution to Many Communication Needs**

- ◆ Emergency services -- natural disasters, accidents, emergency response, fires
- ◆ Safety services -- "man down" alarms
- ◆ Factory floor operations -- cranes, other machinery

**Flight Test Telemetry -- Unique to Aerospace**

# **Spectrum Realities**

## **(continued)**

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### **Some Needs Can Be Satisfied by Both Commercial Mobile and Private Radio Services, But With Varying Degrees of Cost and Efficiency**

- ◆ Cellular provides mobile communication, but is inflexible and suffers from inadequate coverage, security, and priority of services
- ◆ Commercial mobile services can be up to 40 times more expensive than private radio
- ◆ Commercial mobile radio service providers have not responded to the needs of industry for tailored wireless services in "thin" markets

### **Boeing Does NOT Treat All Radio Services as "Add-On" Capabilities**

- ◆ Boeing integrates radio services into its manufacturing processes and optimizes for efficiency and flow time.

# **Spectrum Economics**

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**Auctions Should Only Be Utilized Where the Principal Use of the Spectrum Will Be to Provide Communications Services to Third Parties for Profit.**

**Auctions Are Appropriate for Such Services Because They Produce Revenues That Reflect the Value of the Business Being Entered, Rather Than the Value of the Spectrum Itself.**

**Private Users Will Almost Always Bid Less Than Entrepreneurs Planning to Use Spectrum to Provide Service to Third Parties for Profit**

**If Private Radio Spectrum Is Auctioned, Users Will Be Compelled to:**

- ◆ pay economically unrealistic prices for spectrum, thereby damaging their competitiveness
- ◆ significantly change their operations, e.g., off-shore production
- ◆ attempt to recoup their "investment" by diverting resources and service to third parties

# **Spectrum Economics**

(continued)

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**Competitive Bidding Would Preclude the Use of Private Radio Spectrum by Boeing because:**

**PCS Auctions Produced \$8.733B (ten year licenses)  
(or \$6.50 per kHz per 1,000 sq. miles/year) <sup>1</sup>**

**Applying the Same Results to the License Period:**

- ◆ Boeing would increase costs by approximately \$40M
- ◆ The aerospace industry would increase costs by approximately \$250M <sup>2</sup>
- ◆ All U.S.-based manufacturers would increase costs by approximately \$6B <sup>3</sup>

**References:**

- <sup>1</sup> Nathan Associates, Inc.
- <sup>2</sup> Aerospace Industries Association of America, Inc.
- <sup>3</sup> Ibid.

# **Spectrum Economics**

## **(continued)**

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**If the FCC Wishes to Recover "a Portion of the Value of the Public Spectrum Resource", Incentive Based License Fees Are a Viable Alternative to Auctions for Private Radio Spectrum**

**If Properly Structured, License Fees Should:**

- ◆ Promote the development and timely deployment of new and innovative radio services and technologies
- ◆ Promote the efficient and intensive use of radio spectrum
- ◆ Not burden licensees who use spectrum efficiently



# **Spectrum Economics**

## **(continued)**

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### **License Fees Should Provide Licensees With an Incentive to Use Spectrum Efficiently**

- ◆ A graduated fee structure should be adopted
- ◆ Inefficient technologies should result in higher license fees than efficient state-of-the-art technologies
- ◆ Efficiency can be objectively measured by a matrix of factors such as: <sup>1</sup>

Per channel bandwidth	(Newer equipment)
Spectrum efficient emissions (TDMA/CDMA)	(Spectrally efficient technology)
Number of units per channel	(Channel density)
Duty cycle	(Use density)
- ◆ License fees should not be so high as to discourage use of efficiency-enhancing state-of-the-art of radio technology

Reference:

<sup>1</sup> Nathan Associates, Inc.

# Summary of Boeing Perspective

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## Spectrum Management Should Reflect the Differences in User Purposes

- ◆ Private use -- managed by coordination and cooperation
- or
- ◆ Commercial use -- managed by free market competition

## Method of Value Recovery

Method	Private Use ("Private Radio")	Third Party Use (Resale)
◆ Competitive Bidding	Inappropriate	Appropriate
◆ License Fees	Appropriate	Inappropriate

# Role of the FCC

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- ◆ **There Is a Continuing Need for Spectrum Management**
- ◆ **The FCC Is the Appropriate Body to Manage Spectrum**
- ◆ **Market Economics Should Not Replace the Public Interest**